**GOALS AND OBJECTIVES**

The overall goal of this descriptive field study was to evaluate physiological markers related to heat stress in migrant agricultural field workers in eastern North Carolina.

Specific Objectives were to:
1. Monitor workers for health and lifestyle factors associated with increased susceptibility to heat stress.
2. Evaluate existing heat index monitoring tools for use in fieldwork environments.
3. Implement environmental monitoring to determine heat levels in the fields.
4. Describe customary fluid intake during the workday.
5. Supervise scheduled supplementation of fluids at intervals.
7. Identify factors associated with increased signs and symptoms of heat stress and related illnesses.
8. Correlate the signs and symptoms of heat stress with environmental data gathered.

**PROTOCOL**

**a. Permission** was obtained from selected Gold Star Growers in eastern North Carolina to collect data from migrant workers on their farms. Informed consent and baseline data was obtained at enrollment. Workers received $10 per day as compensation for wages lost while participating in study activities.

**b. Field Study Team:** On observation days, a field study team went to the worker’s residence to make the initial daily observations. The team consisted of a nurse, a Spanish language interpreter, a person to maintain environmental monitoring instruments, and two other team members to assist with measurements and observations.

**c. Question Battery:** Workers were asked questions which included: number of days worked in the last two weeks, and what food/beverages were consumed last night and this morning. The worker was then weighed. At this time observations were also noted as to the headwear, shirt, trousers, and shoes that the worker was wearing.

**d. Measurement Battery:** The first physiological measurements of the day were made including pulse, respiration, lying and standing blood pressures, and tympanic temperature. The worker was then asked if he had any of the following signs and symptoms of potential heat stress: muscle spasms, fatigue or tiredness, nausea, vomiting, flushing, sweating, and warm, dry skin. The worker was given a test of cognition. After this initial testing, the migrant worker then began his regular workday.

**RESULTS**

1. **PARTICIPANT CHARACTERISTICS**

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBJECTS</td>
<td>38 Hip Males</td>
<td>59 Hip Males</td>
<td>59 Hip Males</td>
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<tr>
<td>STUDY PERIOD</td>
<td>16 days</td>
<td>19 days</td>
<td>19 days</td>
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<tr>
<td>WTD(EVS)</td>
<td>M(109)</td>
<td>M(109)</td>
<td>M(109)</td>
</tr>
<tr>
<td>BM(EVS)</td>
<td>M(25.6)</td>
<td>M(25.2)</td>
<td>M(25.9)</td>
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2. **HEAT STRESS INDEX VS SEVERITY OF THE ENVIRONMENT**

   **a. Heat Stress:** For each participant on each day, two heat stress indexes were computed. Inputs to the index based on REPORTED items were average excess over baseline for fatigue, headache, spasms, and nausea. Inputs to the index based on MEASURED items were average excess over baseline for respiratory rate, pulse rate, orthostatic blood pressure differential (both systolic and diastolic), and tympanic temperature. An OVERALL index was computed as OVERALL=REPORTED+MEASURED.

   **b. Severity of Day:** A measure of the severity of the day was devised using criteria developed by NWS and ACSM ACSM risk categories are: WBGT> 90 deg: Dangerous; 82-90 deg: Very High Risk; 73-83 deg: High Risk; 65-73 deg: Moderate Risk <65 deg: Low Risk)

3. **Summary of Findings**

This study found that workers experienced more symptoms of heat stress on more severe days, but the heat was not severe enough to cause adverse physiological effects. Further, we found no significant differences between workers who received the intervention fluids and those who did not. Study findings suggest that if farm workers are in reasonable physical condition and they work on well run farms with good working conditions, no additional interventions are necessary to prevent heat stress.